Two New Gypsophilous Species of Machaeranthera (Asteraceae-Astereae) from North-central Mexico

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Exploration in northcentral Mexico has continued to turn up a wealth of new species, mostly gypsophiles (Turner, 1972; 1973). I have collected and observed the two species named below for several years in the field and there can be no doubt as to their biological status as good taxa. It was my intention to revise the group to which these belong (sect. Primitives) but fortunately, Mr. Ron Hartman of the University of Texas, has become interested in the species concerned and has embarked upon a more inclusive study than I might have attempted. It seemed appropriate then to put on record my observations prior to his doctoral study of the group.

Machaeranthera crutchfieldii Turner, sp. nov.

Suffrutices ad 40 cm. alti caulibus veteribus demum distincte lignosis ad 6 mm. crassis. Folia oblanceolata gradatim angustata basi petioliformibus; laminae utrinque uniformiter pubescentes pilis mollibus crispatis margine ciliata obscure serrulata dentibus in quoque latere 14--16 in quoque dente trichomate albo-ceracea. Capitula radiata solitaria. Pedunculi remoti 2--6 cm. longi. Involucrum hemisphericum. Bracteae distincte 4--5 seriatae 2--5 mm longae adpressae sparse pubescentes pilis albis crispatis non glandularibus apice distincte albo-mucronatae non reflexae. Receptaculum planum vel parum convexum alveolatum ca 6 mm diametro. Flores radiati ca 21, lingulis albis ca 10 mm longis. Flores disci ca 80 corolla flava actinomorpha ca 5 mm longa lobis 5 acutis ca 0.5 mm longis. Rami styli plani ca 1 mm longi appendicibus conspicuis acutis pubescentibus. Achenia late prismatica ca. 1.0 mm longa dense albo-pubescentia. Pappus setis numerosis 4--5 mm longis minute ciliatis. Chromosomatum numerus $n = 4$.

Subshrub to 30 cm tall, the older stems becoming quite woody, up to 6 mm thick. Leaves oblanceolate, gradually tapered so as to appear petiolate at the base; blades evenly soft (crinkled) pubescent on both surfaces, ciliate with 14-16 white pairs of waxy trichomes which terminate ill-defined serrations. Heads radiate, solitary on distantly arranged peduncles, the latter 2-6 cm long. Involucre hemispheric, the bracts graduate appressed, 2-5 mm long, markedly 4-5 seriate, sparsely pubescent with white, crisped hairs and terminated by a distinct white mucro, not at all glandular pubescent or reflexed at the apex. Receptacle flat, or slightly convex, ca 6 mm across, alveolate. Ray florets ca 21, the ligules

white, ca 10 mm long. Disc florets yellow, ca 80 per head; corolla regular, ca 5 mm long, 5-lobed, the lobes acute, ca 0.5 mm long. Style branches flat, ca 1 mm long, with well defined acute, pubescent appendages. Achenes broadly prismatic, ca 1.0 mm long, densely white pubescent; pappus of numerous stiff, minutely ciliate bristles, 4–5 mm long.

Chromosome number, n = 4 pairs.

HOLOTYPE (TEX): MEXICO. Nuevo Leon: 17 mi east of San Roberto Junction and then south on dirt (mine) road for 2 mines. Occurring locally on bare, rocky, "gypsum" (anhydrite) outcrops on south slopes. 24 Oct 1970 B. L. Turner & John Crutchfield 6324. (ISOTYPE: MEXU).

The species is known by only one other collection, San Luis Potosi. Charcas. Jul-Aug. 1934. C. L. Lundell 5395 (MICH, US). Dr. R. C. Jackson, after examining the US specimen, independently recognized the taxon as distinct, proposing another, as yet unpublished, name for the species. M. crutchfieldii is most closely related to M. gypsophila but is readily distinguished from that species by its woody habit, sparsely flowering, monocephalic, nonglandular peduncles and relatively small, very gradate involucral bracts.

It is a pleasure to name the species for my frequent companion-in-the-field, Mr. John Crutchfield, who manages the Biological Field Station at The University of Texas at Austin. Prior to this appointment, he worked for several years as a field botanist with the Texas Research Foundation, Renner.

Machaeranthera gypsophila Turner, sp. nov.

Herbae perennes (10--)15--50 cm altae radice crassa lignosa caulibus erectis. Folia simplicia sessilia vel subsessilia oblonga oblanceolatave spathulatave apice trichomate albo-ceracea infima 1.5--3 cm longa sursum gradatim reducta margine irregulariter serrata dentibus in quoque latere 6--12 in quoque dente trichomate albo ceracea. Capitula radiata solitaria. Pedunculi 1--3 (--5) cm longi dense glandulo-pubescentes. Involucrum hemisphericum 1.0--1.5 cm diametro. Bracteae lineares 3--4-seriatae seriebus inaequalibus. Receptaculum planum diametro 5--8 mm alveolatum squamis albidis 0.5--2 mm longis. Flores radiati ca 21 pistillati verosimiliter fertiles ligulis linearibus 10--15 mm longis 2--3 mm latis alibis vel subtus saepe subroseis roseisve tubulis angustis 2--3 mm longis. Flores disci 80--100 vel multiores corolla flava 5--6 mm longa tubulo ca 2 mm longo fauce anguste infundibuliformi 3--4 mm longa lobis 5 acutis ca 1 mm longa. Rami styli plani 2--3 mm longi appendicibus acuminatis 1--1.5 mm longis pubescentibus. Achenia prismatica 1.5--2 mm longa dense albo-pubescentia. Pappus setis numerosis 3--5 mm longis.

Chromosomatum numerus n = 4.

Herbaceous perennial, (10)15-50 cm tall, the stems erect from a thick, woody tap root. Leaves simple, sessile to subsessile, oblong, oblanceolate to spatulate, the lowermost 1.5-3.0 cm long, 0.6-1.5 cm wide, becoming progressively reduced upwards; blades densely glandular-pubescent on both surfaces; margins irregularly serrate with 6-12 serrations to any one marginal side, the serrations and apices terminated by conspicuous, white, waxy trichomes. Heads radiate, solitary on relatively short peduncles, the latter 1-3(5) cm long, densely glandular-pubescent. Involucre hemispheric, 1.0-1.5 cm across, the bracts linear and gradate in 3-4 series. Receptacle flat, 5-8 mm across, alveolate with white, irregular scales and chaff, the latter 0.5-2.0 mm long. Ray florets ca 21, pistillate and presumably fertile; ligules 10-15 mm long, 2-3 mm wide, linear, white, often pinkish to rose-colored beneath, the tube narrow, 2-3 mm long. Disc florets yellow, 80-100, or more; corolla 5-6 mm long, tube ca 2 mm long, throat narrowly funnelform, 3-4 mm long, 5-lobed, the lobes acute, ca 1 mm long. Style branches flat, 2-3 mm long, the stigmatic portion terminated by an acuminate, pubescent appendage, 1.0-1.5 mm long; achenes prismatic, 1.5-2.0 mm long, densely white pubescent; pappus of numerous white bristles, 3-5 mm long.

Chromosome number, n = 4 pairs.

HOLOTYPE (TEX): MEXICO. Coahuila: 14 mi s of Cuatro Cienegas on highway to San Pedro, then 1.8 mi w on dirt road to actively blowing dunes of gypsum. 11 Apr 1970. B. L. Turner 6052 (ISOTYPES: MEXU, MICH).

The species is most closely related to Machaeranthera gymnocephala DC. and M. blephariphylla Gray; in fact, it stands morphologically and geographically somewhat between these two taxa, all of which are diploid with n = 4 and presumably belong to the section Primitives (Hartman, unpubl.). Dr. R. C. Jackson, to judge from recently annotated material at the U. S. National Herbarium, apparently included specimens of M. gypsophila in his concept of M. gymnocephala, but the latter is a lavender-rayed taxon of mostly igneous soils in mountainous areas of central Mexico. M. gypsophila seems confined to gypsum at the type locality but presumably can occur on mixed gypseous or perhaps occasionally limestone soils at other localities (e.g., it occurs in what appear to be calcareous soils in Brewster Co., Texas and Socorro Co., New Mexico, but at nearly all these localities abundant gypsum outcrops can be found in the immediate vicinity).

Machaeranthera gypsophila is also related to M. crutchfieldii, but the latter is a much rarer, more montane species, having been

found to date only on rocky (anhydrous) gypsum. The several rayless and white-rayed taxa mentioned above can be recognized by the following key:

1. Heads eradiate; subshrubs or divaricately branched, suffruticose perennials; restricted endemics on gypsum soils near Cuatro Cienegas and Monclovo, Coahuila, Mexico.

    2. Heads sessile, appearing as if embedded in the apices of rope-like branches; sparsely branched, rigid subshrubs (hybridizing with M. gypsophila, the intermediates, except for their abortive ray florets, resembling M. johnstonii); known only from the immediate vicinity of Cuatro Cienegas, Coahuila . . . . . 1. M. restiformis

    2. Heads on short peduncles, 1-10 mm long, not appearing as if embedded in the apices of rope-like branches; divaricately branched, bushy subshrubs . . . . . 2. M. johnstonii

1. Heads radiate; herbaceous biennials (?) or perennials with relatively simple, erect stems; widespread species of north central Mexico, adjacent Texas and New Mexico (3).

3. Ray flowers lavender; involucral bracts becoming narrowly linear and green toward the apex (i.e. with a different texture than its base) and usually reflexing; stems usually from an annual- or biennial-appearing tap root; central Mexico in igneous or less often calcareous (?) soils . . . . . 3. M. gymnocephala

3. Ray florets white (the ligules often pink or rose-colored beneath, but never lavender throughout as in M. gymnocephala); stems from a woody caudex or perennial tap root; involucral bracts mostly of a uniform texture, not decidedly green and herbaceous so as to reflex toward the apices (4).

4. Foliage and peduncle loosely tomentose, not at all hispid or glandular pubescent; stems several from a very woody caudex . . . . . 4. M. crutchfieldii

4. Foliage and peduncle conspicuously hispid or densely glandular pubescent; stems mostly few, elongate from a well developed woody to herbaceous tap root (5).

5. Peduncles and stems densely and uniformly hispid, without glandular trichomes; serrations 14-20 (or more) along any one side of a leaf margin; plants of rocky limestone soils in montane regions of trans-Pecos Texas and adjacent New Mexico . . . . . 5. M. blephariphylla

5. Peduncles and stems densely and uniformly hispid with glandular-knobbed hairs; serratious 5-12 along any one side of a leaf margin; plants of gypsum or mixed calcareous-gypseous soils, usually at lower elevations . . . . . 6. M. gypsophila

Machaeranthera gypsophila often occurs with the quite distinct, yellow rayed species, M. pinnatifida (Hook) Shinners, but to date no natural hybrids between these have been found; however, Dr. A. M. Powell and students (Pers. comm.) grew plants from seed collected at such mixed sites and some of these seemed to be F_1 hybrids between the two species. M. gypsophila does, however, hybridize readily with an as yet undescribed, bizarre species of Machaeranthera (Turner and Sanderson, 1971; Turner, 1973) at several sites in and about Cuatro Cienegas, which is near the type locality of both taxa.

Literature Cited

Turner, B. L. 1972. Two new gypsophilous species of Gaillardia (Compositae) from northcentral Mexico. Southwestern Naturalist: 181-190.

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